



NOAA SCIENTIFIC PUBLICATIONS REPORT JANUARY 21, 2014

HIGHLIGHTED ARTICLES

OAR Publications

[The relative roles of the ocean and atmosphere as revealed by buoy air-sea observations in hurricanes](#)

Monthly Weather Review (2.76)

[Nuclear power station accident by coupling simulations of atmospheric dispersion model with improved deposition](#)

Atmospheric Chemistry and Physics (5.298)

[Arctic tropospheric warming: causes and linkages to lower latitudes](#)

Journal of Climate (4.904)

NMFS Publications

[Biologically Important Areas for Cetaceans within the US Exclusive Economic Zone – overview and rationale](#)

Aquatic Mammals – Special Issue on Biologically Important Areas (0.702)

ADDITIONAL ARTICLES

NWS Publications

[An examination of wind decay, sustained wind speed forecasts, and gust factors for recent tropical cyclones in the mid-Atlantic region of the United States](#)

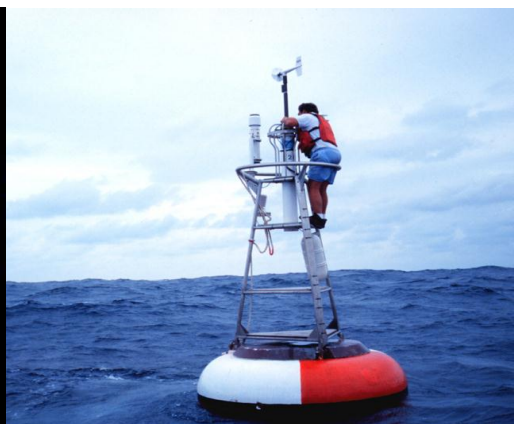
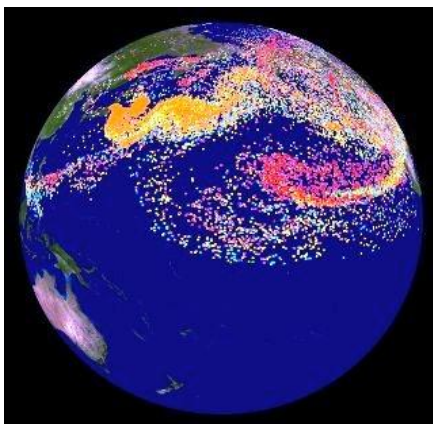
Weather and Forecasting (1.860)

NMFS Publications

[Ba/Ca ratios in teeth reveal habitat use patterns of dolphins](#)

Marine Ecology Progress Series (2.64)

[Simulations to evaluate trade-offs among marine mammal consumption needs, commercial fishing fleets and finfish biomass](#)





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[Physical associations to spring phytoplankton biomass interannual variability in the U.S. Northeast Continental Shelf](#)

Journal of Geophysical Research: Biogeosciences (3.44)

[Influence of predator–prey evolutionary history, chemical alarm-cues, and feeding selection on induction of toxin production in a marine dinoflagellate](#)

Limnology and Oceanography (3.62)

[Influence of one selected *Tisochrysis lutea* strain rich in lipids on *Crassostrea gigas* larval development and biochemical composition](#)

Aquaculture Nutrition (1.665)

[Anadromy and residency in steelhead and rainbow trout *Oncorhynchus mykiss*: a review of the processes and patterns](#)

Canadian Journal of Fisheries and Aquatic Sciences (2.276)

[Evidence of between-population variation in morphology and thermal plasticity of agonistic behavior in two genetically distinct populations of steelhead](#)

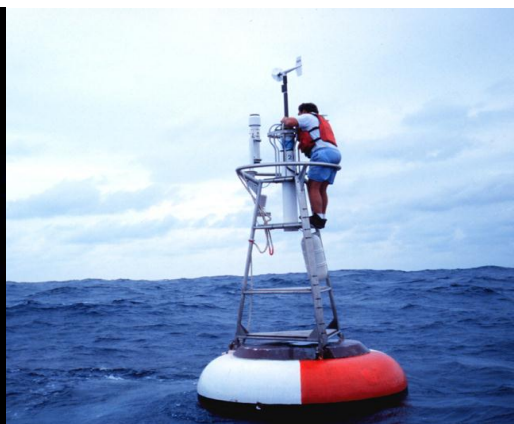
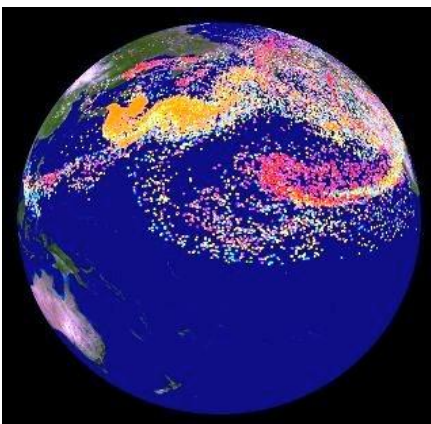
Environmental Biology of Fishes (1.356)

[Myths that continue to impede progress in ecosystem-based fisheries management](#)

Fisheries (2.32)

[Herbivory and the resilience of Caribbean coral reefs: knowledge gaps and implications for management](#)

Marine Ecology Progress Series (2.64)





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[Applied fisheries oceanography: ecosystem indicators of ocean conditions inform fisheries management in the California Current](#)

Oceanography (2.986)

[Expression profiles of Fsh-regulated ovarian genes during oogenesis in coho salmon](#)

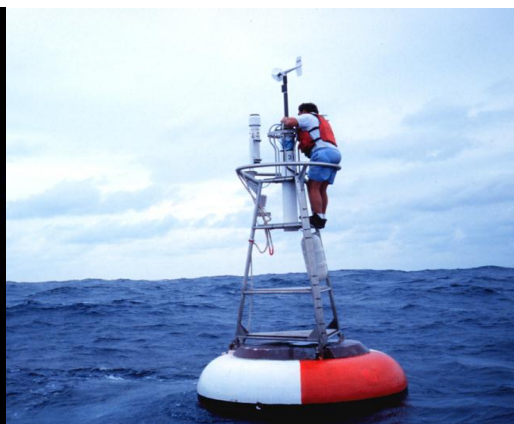
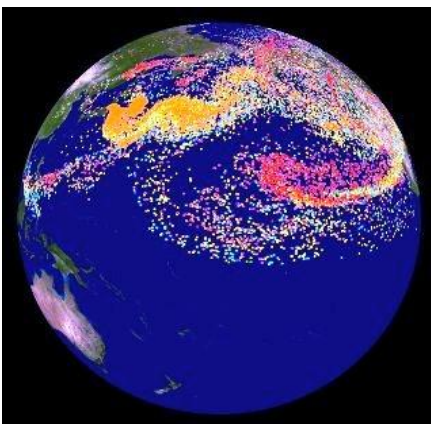
PLoS One (3.534)

[Whale research by Roy Chapman Andrews in Japan and Korea: retracting his footsteps around Japan in 1910–1910](#)

Japan Cetology (unknown)

[Increasing hydrologic variability threatens depleted anadromous fish populations](#)

Global Change Biology (8.224)





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HIGHLIGHTED ARTICLES

The relative roles of the ocean and atmosphere as revealed by buoy air-sea observations in hurricanes

Monthly Weather Review (2.76)

J. J. Cione (OAR/AOML)

- This study uses observations from 62 hurricanes over 32 years to investigate the commonly-held theory that hurricanes are maintained by upper ocean temperatures alone.
- The author finds that besides the ocean, near-surface air temperature and moisture play a large, often dominant, role in maintaining a hurricane, with atmospheric moisture conditions in areas of high wind speeds causing the “80-degree F threshold” for hurricanes.
- For hurricanes within 29 degrees latitude of the equator, the atmosphere, not the ocean, was found to be the most important factor in maintaining the hurricane.

This study investigates the (often unchallenged) notion that the ocean alone, primarily drives the energy requirements to maintain a hurricane. Observations from 62 hurricanes over a 32-year period (1975-2007) support a different, much more nuanced conclusion. Results from this study show that near-surface atmospheric temperature and moisture conditions play a large, often dominant, role as it relates to sustaining a hurricane. In fact, the long-held assertion that ocean surface temperatures of 80°F or higher are required to maintain a hurricane was not supported for 6% of the cases studied. In addition, for deep tropic storms, the atmosphere (not the ocean) was found to be the primary factor responsible for determining how much surface energy was drawn up out of the ocean and into the hurricane environment.

Expected publication date: February 2015

<http://dx.doi.org/10.1175/MWR-D-13-00380.1>

Nuclear power station accident by coupling simulations of atmospheric dispersion model with improved deposition





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Atmospheric Chemistry and Physics (5.298)

G. Katata, M. Chino, T. Kobayashi, H. Terada, M. Ota, H. Nagai, M. Kajino, **R. Draxler (OAR/ARL)**, M. C. Hort, A. Malo, T. Torii and Y. Sanada

- Temporal variations in the amount of radionuclides released into the atmosphere during the Fukushima Daiichi Nuclear Power Station accident and their atmospheric and marine dispersion are essential to evaluate the environmental impacts and resultant radiological doses to the public.
- In this study, the authors estimate the total amounts of released Iodine 131 and Cesium 137 using a new method that includes directly measured ocean deposition rates as opposed to temporal interpolation between release rates computed from land based measurements.
- The authors found deposition rates higher than previous estimates for both radionuclides (151 and 14.5 PBq, for Iodine 131 and Cesium 137, respectively).

Temporal variations in the amount of radionuclides released into the atmosphere during the Fukushima Daiichi Nuclear Power Station (FNPS1) accident and their atmospheric and marine dispersion are essential to evaluate the environmental impacts and resultant radiological doses to the public. In this paper, we estimate a detailed time trend of atmospheric releases during the accident by combining environmental monitoring data with atmospheric model simulations from WSPEEDI-II (Worldwide version of System for Prediction of Environmental Emergency Dose Information), and simulations from the oceanic dispersion model SEA-GEARN-FDM, both developed by the authors. According to the simulation results, the highest radioactive contamination areas around FNPS1 were created from 15 to 16 March by complicated interactions among rainfall, plume movements, and the temporal variation of release rates associated with reactor pressure changes in Units 2 and 3. The modified WSPEEDI-II simulation using the new source term reproduced local and regional patterns of cumulative surface deposition of total ^{131}I and ^{137}Cs and air dose rate obtained by airborne surveys. The new source term was also tested using three atmospheric dispersion models (MLDP0, HYSPLIT, and NAME) for regional and global calculations and showed good agreement between calculated and observed air concentration





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and surface deposition of ^{137}Cs in East Japan. Moreover, HYSPLIT model using the new source term also reproduced the plume arrivals at several countries abroad showing a good correlation with measured air concentration data. The computations showed that approximately 27% of ^{137}Cs discharged from FNPS1 deposited to the land in East Japan, mostly in forest areas.

Expected publication date: January 2015

Arctic tropospheric warming: causes and linkages to lower latitudes

Journal of Climate (4.904)

J. Perlwitz, M. Hoerling, and R. Dole (OAR/ESRL)

- Although sea ice loss is a significant contributor to Arctic surface warming, it is not the main reason for increased temperatures in the troposphere.
- The factors responsible for tropospheric warming are recent decadal fluctuations, and long-term increases in sea surface temperatures, both located outside the Arctic.
- Arctic sea ice loss is not a main driver of recent occurrence of extreme weather and climate events in mid-latitudes.

In recent decades, warming global temperatures at the Earth's surface and in the troposphere (the lowest layer of our atmosphere) have been more pronounced in the Arctic, especially during fall and early winter. Because this warming has coincided with receding sea ice, some scientists have theorized that sea ice loss is the first link in a chain in which Arctic changes affect extreme weather events at lower latitudes. The authors ran model experiments to better understand if sea ice loss really is the driver. Their results suggest that Arctic sea ice decline accounts for only a small percentage of deep tropospheric warming. Instead, recent decadal fluctuations and long-term increases in sea surface temperatures, both located outside the Arctic, are the cause of most of the warming. In consequence, the Arctic troposphere has been mainly responding to, rather than forcing, mid-latitude weather and climate.

Expected publication date: Unknown

<http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-14-00095.1>





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Biologically Important Areas for Cetaceans within the US Exclusive Economic Zone – overview and rationale

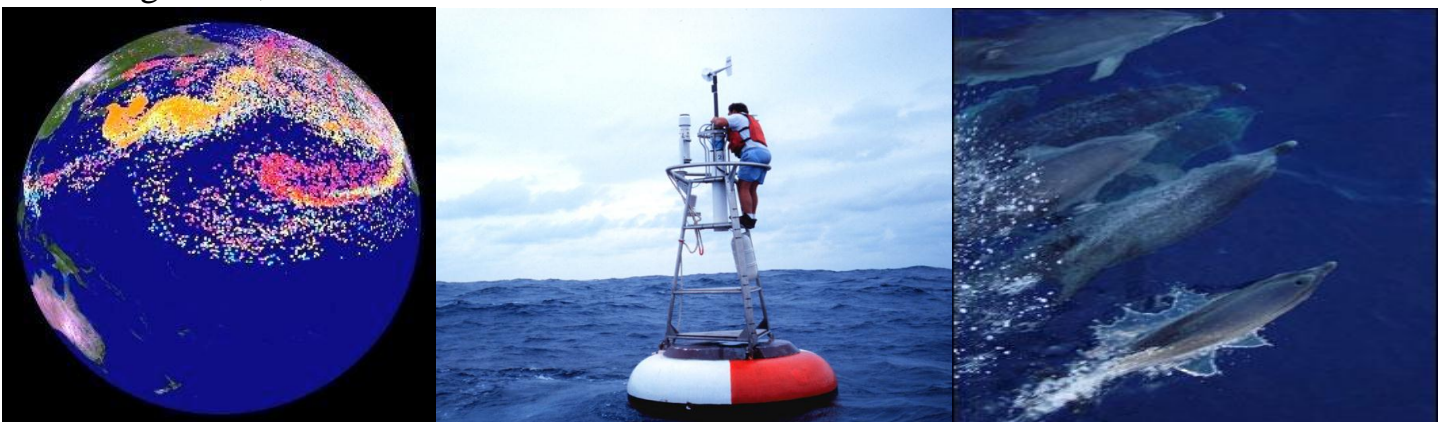
Aquatic Mammals – Special Issue on Biologically Important Areas (0.702)

M. C. Ferguson (NMFS/NMML), J. Harrison (NMFS/OPR), and S. Van Parijs, (NMFS/NEFSC)

- Biologically Important Areas (BIAs) were identified through an expert elicitation process.
- BIAs are intended to provide a science-based tool to aid both regulators, such as NOAA, and regulated entities in the studies and planning that are required under multiple US statutes to characterize, analyze, and minimize the impacts of anthropogenic activities on cetaceans and to achieve conservation and protection goals.
- In addition, BIAs may be used to identify information gaps and prioritize future research to better understand cetaceans, their habitat, and ecosystem.

In this review, the authors outline the rationale and process used by the Cetacean Density and Distribution Mapping Working Group to identify Biologically Important Areas (BIAs) for 23 cetacean species in seven regions within the US Exclusive Economic Zone.

Subsequent chapters in this journal elaborate on each BIA for each species and region. BIAs are defined as areas and times where migratory species feed, migrate, mate, give birth, or are found with neonates or other sensitive age classes. A separate type of BIA is defined for small and resident populations. BIAs are intended to provide a science-based tool to aid both regulators, such as NOAA, and regulated entities in the studies and planning that are required under multiple US statutes to characterize, analyze, and minimize the impacts of anthropogenic activities on cetaceans and to achieve conservation and protection goals. BIAs were identified through an expert elicitation process. Information provided for each BIA includes: a summary of the information upon which the BIA was based; a map of the BIA; a metadata table detailing the type and quantity of information used to define the BIA (supplementary material available online), providing a transparent method for evaluating the BIA designation; and references. The information contained in the BIAs will assist





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scientists, resource managers, and the public in the characterization, analysis, and minimization of anthropogenic impacts on cetaceans. In addition, BIAs may be used to identify information gaps and prioritize future research to better understand cetaceans, their habitat, and ecosystem. The strengths and limitations of BIAs are discussed.

Expected publication date: 1 March 2015

ADDITIONAL ARTICLES

NWS Publications

An examination of wind decay, sustained wind speed forecasts, and gust factors for recent tropical cyclones in the mid-Atlantic region of the United States

Weather and Forecasting (1.860)

B. Tyner, A. Aiyyer, **J. Blaes**, and **D. R. Hawkins** (NWS/WFO)

- Recent NWS forecasts for tropical cyclones impacting the Mid-Atlantic have slightly over predicted sustained wind speeds for land areas.
- The study suggests some possible improvements to make so that NWS forecasts of wind speed and gusts for land falling tropical cyclones are improved.
- Use of these suggestions may help the NWS better meet its mission of saving lives and property.

In this study, several analyses were conducted that were aimed at improving sustained wind speed and gust forecasts for Tropical Cyclones (TCs) affecting coastal regions. An objective wind speed forecast analysis of recent TCs affecting the Mid-Atlantic region was first conducted to set a benchmark for improvement. Forecasts from the National Digital Forecast Database were compared to observations and surface wind analyses in the region. The analysis suggests a general over prediction of sustained wind speeds, especially for areas affected by the strongest winds. Currently, National Weather Service Forecast Offices use a software tool known as the TCMWindTool to develop their wind forecast grids. The tool assumes linear decay in the sustained wind speeds when interpolating the National Hurricane Center 12-24 hourly TCM product to hourly grids. An analysis of post landfall wind decay for recent TCs was conducted to evaluate this assumption. Results indicate that





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large errors in the forecasted wind speeds can emerge, especially for stronger storms. Finally, an analysis of gust factors for recent TCs affecting the region was conducted. Gust factors associated with weak sustained wind speeds are shown to be highly variable but average around 1.5. The gust factors decrease to values around 1.2 for wind speeds above 40 kts and are in general insensitive to the wind direction, suggesting local rather than upstream surface roughness largely dictates the gust factor at a given location. Forecasters are encouraged to increase land reduction factors used in the TCMWindTool and to modify gust factors to account for factors including the sustained wind speed and local surface roughness.

Expected publication date: Early 2015

<http://journals.ametsoc.org/doi/pdf/10.1175/WAF-D-13-00125.1>

NMFS Publications

Ba/Ca ratios in teeth reveal habitat use patterns of dolphins

Marine Ecology Progress Series (2.64)

S. Botta, C. Albuquerque, **A. A. Hohn (NMFS/SEFSC)**, V. M. F. da Silva, M. C. O. Santos, C. Meirelles, L. Barbosa, A. P. M. Di Benedetto, R. M. A. Ramos, C. Bertozzi, M. J. Cremer, V. Franco-Trecu, N. Miekeley, and E. R. Secchi

- This study is the first to examine the relation between Ba/Ca and Sr/Ca levels in aquatic mammals and the physicochemical characteristics of their environment, and successfully discriminated stocks from marine and freshwater habitats.
- These results set the stage for integrating the analysis of Ba/Ca (and/or Sr/Ca in the case of a strong environmental gradient in their values) in teeth and the time-recording property of dentine deposition, theoretically making it possible to reconstruct habitat use of marine mammals over the course of their lives.

Teeth and otoliths are metabolically inert structures that preserve a chronology of chemical variations that may be related to the environmental histories experienced by each organism. Because of the natural decrease of barium and increase of strontium bioavailability in water





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with increasing salinity, these elements may be especially useful to track habitat use in aquatic organisms. Therefore, we tested whether the Ba/Ca and Sr/Ca ratios in dolphins' teeth represent a salinity gradient. The main aim was to determine whether these elements can be used as a natural tag for different aquatic environments. Teeth from two freshwater dolphins (*Inia geoffrensis* and *Sotalia fluviatilis*) and two marine species (*S. guianensis* and *Pontoporia blainvillei*) from Brazil and Uruguay were analyzed using Laser Ablation Inductively Coupled Plasma-Mass Spectrometer. Intensity ratios of $^{138}\text{Ba}/^{43}\text{Ca}$ and $^{86}\text{Sr}/^{43}\text{Ca}$ were measured along a line that covered all growth increments in the dentin from the second year of life onwards. Teeth from the freshwater species had mean Ba/Ca values tenfold higher than marine dolphins, confirming the inverse relationship between salinity (and thus ambient Ba/Ca) and teeth ratios. Furthermore, Ba/Ca ratios could also differentiate dolphins from lower-salinity estuarine areas from those of areas with minimal freshwater discharge. No significant differences were found for Sr/Ca values. Results presented encouraging indications for the application of this technique as a potential new tool for studying habitat use in aquatic mammals.

Accepted: 8 December 2014

Simulations to evaluate trade-offs among marine mammal consumption needs, commercial fishing fleets and finfish biomass

Marine Ecological Progress Series (2.64)

L. Smith, R. Gamble, S. Gaichas, and J. Link (NMFS/NEFSC)

- Our simulations suggest that marine mammal predation can affect trajectories and reference points for commercially fished species
- Human caused direct mortality is the most important factor for recovery of marine mammal populations, although the rate of increase for marine mammals can be reduced with greatly increased fishing mortality on fish populations

In setting fisheries management quotas, fish interactions with marine mammals are rarely considered. Even less often considered are indirect effects from fishing and species interactions or potential changes to ecosystem structure as marine mammal populations





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rebuild. To explore these interactions, we used a multi-species production model to evaluate the interactions between mixed fleet fisheries, their target species, and marine mammals in an ecosystem representative of the Northeast US continental shelf. We simulated changes to biomass and catch trajectories and compared these to associated biological reference points for commercially important finfish and current biomass levels of marine mammals. Marine mammal populations increased over time in our simulations, even considering uncertainty in the amount of dependence on commercial species as prey, unless direct human caused mortality is much higher than observed. Greatly increased fishing mortality can reduce the rate of increase for marine mammals, slowing recovery for some populations. This is due to a combination of reduced prey and increased interactions with fishing vessels (bycatch or vessel strikes) as fishing effort increases. Our model suggests that managing human caused direct mortality is the most important factor for recovery of marine mammal populations, but fishery management plays an important role in avoiding the additional stress of reduced prey populations. Marine mammal predation can also affect trajectories and reference points for commercially fished species. These types of evaluations of direct human-induced mortalities as well as trade-offs between mixed fishery fleets and protected species requirements are essential as we transition to Ecosystem-Based Fisheries Management.

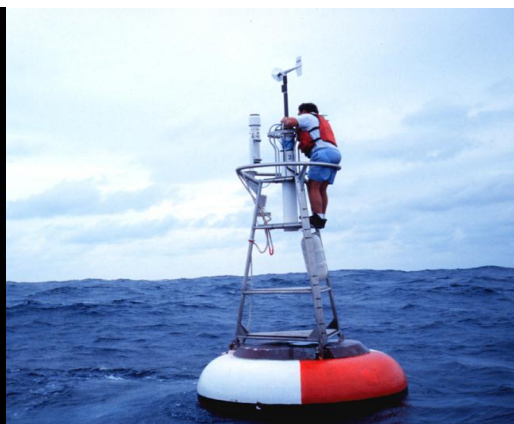
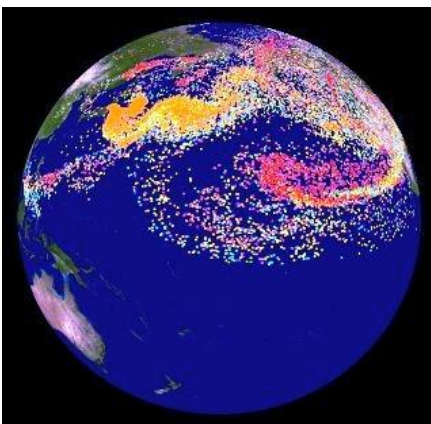
Expected publication date: March 2015

Physical associations to spring phytoplankton biomass interannual variability in the U.S. Northeast Continental Shelf

Journal of Geophysical Research: Biogeosciences (3.44)

V. S. Saba, K. J. W. Hyde, N. D. Rebuck, K. D. Friedland, J. A. Hare, M. Kahru, and M. J. Fogarty (NMFS/NEFSC)

- Ocean color satellite measurements used to identify the local and remote physical associations to interannual variability of spring surface chlorophyll-*a* (1998-2013) off the Northeast US and Nova Scotia.
- Nitrate limitation likely not the primary constraint on the interannual variability of the spring bloom throughout all regions.





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- Generalized linear models suggest that we can resolve 88% of March chlorophyll-*a* interannual variability in Georges Bank using lagged physical data.

The continental shelf of the Northeast United States and Nova Scotia is a productive marine ecosystem that supports a robust biomass of living marine resources. Understanding marine ecosystem sensitivity to changes in the physical environment can start with the first order response of phytoplankton (i.e. chlorophyll-*a*), the base of the marine food web. However, the primary physical associations to the interannual variability of chlorophyll-*a* in these waters are unclear. Here the Authors used ocean color satellite measurements and identified the local and remote physical associations to interannual variability of spring surface chlorophyll-*a* from 1998 to 2013. The highest interannual variability of chlorophyll-*a* occurred in March and April on the northern flank of Georges Bank, the western Gulf of Maine, and Nantucket Shoals. Complex interactions between winter wind speed over the Shelf, local winter water levels, and the relative proportions of Atlantic versus Labrador Sea source waters entering the Gulf of Maine from the previous summer/fall were associated with the variability of March/April chlorophyll-*a* in Georges Bank and the Gulf of Maine. Sea surface temperature and sea surface salinity were not robust correlates to spring chlorophyll-*a*. Surface nitrate in the winter was not a robust correlate to chlorophyll-*a* or the physical variables in every case suggesting that nitrate limitation may not be the primary constraint on the interannual variability of the spring bloom throughout all regions. Generalized linear models suggest that we can resolve 88% of March chlorophyll-*a* interannual variability in Georges Bank using lagged physical data.

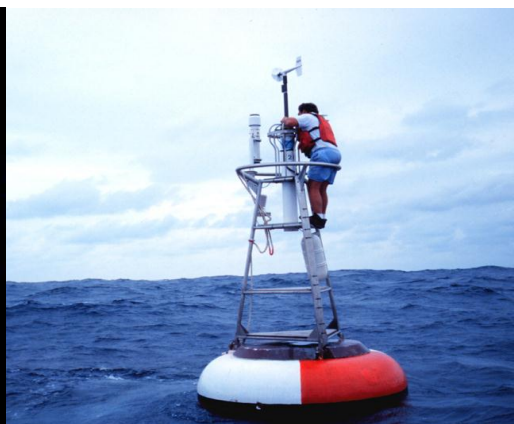
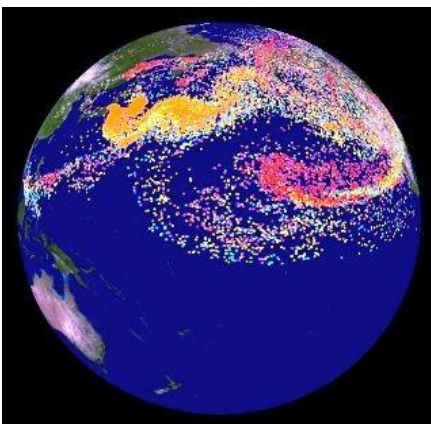
Accepted: January 2015

<http://onlinelibrary.wiley.com/doi/10.1002/2014JG002770/pdf>

Influence of predator–prey evolutionary history, chemical alarm-cues, and feeding selection on induction of toxin production in a marine dinoflagellate

Limnology and Oceanography (3.62)

C. D. Senft-Batoh, H. G. Dam, S. E. Shumway, **G. H. Wikfors (NMFS/NEFSC)**, and C. D. Schlichting





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- Copepod grazers induce toxin production by the New England red tide dinoflagellate *Alexandrium fundyense*
- Toxin induction is higher by populations of copepods from areas where red tides have occurred historically than by naïve copepod populations
- Red tides can become more toxic with repeated occurrence in an area

The dinoflagellate, *Alexandrium fundyense*, produces paralytic shellfish toxins and co-occurs with populations of the copepod, *Acartia hudsonica*, from Maine, but not New Jersey. The authors tested the hypothesis that history of co-occurrence between predator and prey effects the ability of prey to recognize and respond to predators with increased toxin production for this copepod-alga interaction. When *A. fundyense* was exposed to waterborne cues released by copepods from Maine (indirect exposure) that were either starved or fed toxic cells, cell toxin quota increased by 35% compared to unexposed controls. The induced response was significantly less for cells exposed to waterborne cues of copepods from New Jersey, and induction (20%) was only elicited by this population when fed toxic cells. These results suggest that *A. fundyense* responded to a kairomone from copepods from Maine, but required a feeding cue from copepods from New Jersey. An increase of approximately 300% in cell toxin quota, however, occurred when cells were directly exposed to grazing, and was independent of copepod population. Evolutionary history, therefore, had no apparent effect when induction was underlain by feeding cues. In assays with a mixture of toxic and nontoxic cells, selection for the latter was evident, and also independent of copepod population. Selectivity for nontoxic cells, however, could not account for changes in cell toxin content in the mixture experiments. When *A. fundyense* was exposed to extracts of toxic or nontoxic *Alexandrium*, toxin production increased significantly (23%), suggesting modest induction by an alga-to-alga alarm signal.

Accepted: January 2014

<http://onlinelibrary.wiley.com/doi/10.1002/lno.10027/pdf>

Influence of one selected Tisochrysis lutea strain rich in lipids on Crassostrea gigas larval development and biochemical composition





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Aquaculture Nutrition (1.665)

F. da Costa, B. Petton, C. Mingant, G. Bougaran, C. Rouxel, C. Quéré, **G. H. Wikfors (NMFS/NEFSC)**, P. Soudant, and R. Robert

- A strain of the microalga *Tisochrysis lutea* selected for high lipid production was shown to be a poor feed for larval oysters in the hatchery
- Disruption of larval lipid metabolism by a distorted microalgal lipid composition was shown to be responsible for poor larval performance on this algal feed

Effects of a remarkably high overall lipid *Tisochrysis lutea* strain (T+) upon gross biochemical composition, fatty acid (FA), sterol, and lipid-class composition of *Crassostrea gigas* larvae were evaluated and compared by the Authors with a normal strain of *Tisochrysis lutea* (T) and the diatom *Chaetoceros neogracile* (Cg). In a first experiment, the influence of different single diets (T, T+, Cg) and a bi-specific diet (TCg) was studied; whereas, effects of mono-specific diets (T and T+) and bi-specific diets (TCg and T+Cg) were evaluated in a second experiment. The strain T+ was very rich in triglycerides (TAG: 93-95% of total neutral lipids), saturated FA (45%), monounsaturated FA (31-33%) and total fatty acids (4.0-4.7 pg cell⁻¹). Larval oyster survival and growth rate were positively correlated with 18:1n-7 and 20:1n-7, in Storage Lipids (SL), and negatively related to 14:0, 18:1n-9, 20:1n-9, 20:4n-6 and trans-22-dehydrocholesterol in Membrane Lipids (ML). Surprisingly, only the essential fatty acid 20:5n-3 in SL was correlated positively with larval survival. Correlations suggest that physiological disruption by overabundance of TAG, FFA and certain fatty acids in larvae fed T+ was largely responsible for the poor performance of these larvae. “High-lipid” strains of microalgae, without regard to qualitative lipid composition, do not always improve bivalve larval performance.

Accepted: January 2015

Anadromy and residency in steelhead and rainbow trout Oncorhynchus mykiss: a review of the processes and patterns

Canadian Journal of Fisheries and Aquatic Sciences (2.276)





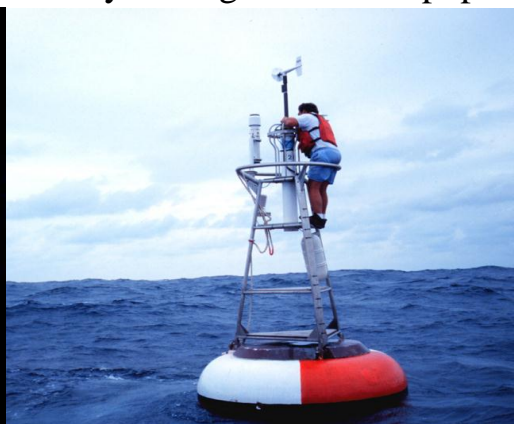
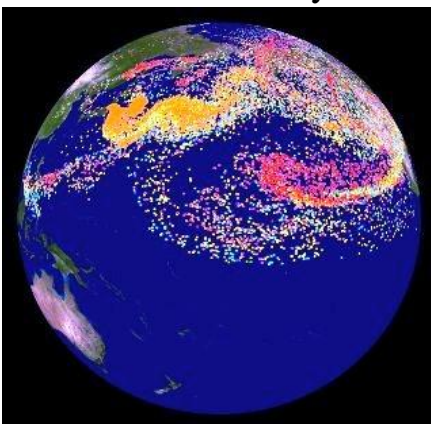
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N. Kendall, J. R. McMillan, M. R. Sloat, T. W. Buehrens, T. P. Quinn, **G. R. Pess**, K. V. Kuzischchin, **M. M. McClure**, and **R. W. Zabel** (NMFS/NWFSC)

- Partial migration, where a fraction of individuals in a population exhibit anadromy and another fraction remain as residents in freshwater, is a common phenomenon in *Oncorhynchus mykiss* throughout their range across the Pacific Rim.
- This review indicates that anadromy and residency in *O. mykiss* are the product of an interaction among genetics, individual condition, and environment. Life history strategy is influenced to a large degree by genetics and individuals can exhibit plasticity under variable environmental conditions.
- The authors found evidence of differences among anadromous and resident individuals in gene expression related to traits such as growth, smolt transformation, and metabolism.

Partial migration, where a fraction of individuals in a population exhibit anadromy and another fraction remain as residents in freshwater, is a common phenomenon in *Oncorhynchus mykiss* throughout their range across the Pacific Rim. Many populations of anadromous *O. mykiss* are threatened, and recovery efforts have generated increased interest in understanding the processes shaping anadromy and residency to help evaluate how populations might respond to restoration actions and climate change. In this paper we review and synthesized the published literature on the patterns of and processes influencing anadromy and residency in *O. mykiss*. Our review indicates that anadromy and residency in *O. mykiss* are the product of an interaction among genetics, individual condition, and environment. As with many salmonines and in support of the conditional strategy theory, there was clear evidence of a proximate influence of individual condition on anadromy and residency. Individual condition also appeared to interact with the ultimate effects of size and age at maturity and iteroparity. Thus, while life history strategy is influenced to a large degree by genetics, individuals can exhibit plasticity under variable environmental conditions. We found evidence of differences among anadromous and resident individuals in gene expression related to traits such as growth, smolt transformation, and metabolism. Patterns in anadromy and residency among and within populations suggested a wide range





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of possible environmental influences at different life stages including water temperature, food supply, stream flow, river geomorphology and the presence of lakes, density dependence, the cost of migration to and from the ocean, and marine survival. Although there were a number of interesting correlations between environmental conditions and life history strategy, direct tests of mechanisms were scarce and there is little empirical data on the extent of residency and anadromy. Consequently, we identify many data gaps, leaving ample room for important future research on these diverse and fascinating fish.

Expected publication date: Winter 2014

<http://dx.doi.org/10.1139/cjfas-2014-0192>

Evidence of between-population variation in morphology and thermal plasticity of agonistic behavior in two genetically distinct populations of steelhead

Environmental Biology of Fishes (1.356)

K. K. Doctor, **B. A. Berejikian**, G. A. Winans, and **D. M. Van Doornik** (NMFS/NWFSC)

- Two different populations of geographically proximate steelhead in the hood canal, WA exhibit differences in morphology and behaviour.
- Morphology differences are most likely related to the flow regime of their natal rivers.
- Whereas behavior seems to be mostly governed by rearing temperature.

Morphological and behavioral traits affect an individual's fitness and can reflect both evolutionary adaptations and phenotypic responses to environmental conditions. The authors conducted a reciprocal transplant 'common garden' experiment at two temperature regimes to test for phenotypic plasticity in morphological and behavioral traits between and within two populations of steelhead *Oncorhynchus mykiss* from Hood Canal, WA, USA. The Dewatto River and Duckabush River populations exhibited asymmetric changes in body morphology in response to the two temperature regimes, suggesting both between- and within-population variation in morphological plasticity. In most cases, within population variation in body shapes was less than between temperature regimes. Most notably the populations differed in dorso-ventral and caudal regions, body depth, and head shape, with some differences on the anterior-posterior placement of the dorsal and ventral





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fins. The warm temperature regime caused more exploratory behavior, more charging behavior, and higher fin erosion, and population effects included slight differences in feeding aggression frequency. Morphology appeared to vary more between populations than between temperature regimes, and behavioral traits varied more between temperature regimes than between populations. Morphological variation may reflect adaptations to variation in freshwater habitat conditions, and both populations show behavioral plasticity in response to temperature.

Expected publication date: Winter 2015

Myths that continue to impede progress in ecosystem-based fisheries management
Fisheries (2.32)

W. Patrick (NMFS/OSF) and J. Link (NMFS/NEFSC)

- This article summarizes decades of EBFM research into a plain language format to communicate EBFM advancements to non-technical experts.
- The article focuses on six commonly held, but untrue, beliefs about impediments that prevent EBFM from being implemented.
- The authors' intent is to remove the false perception that EBFM is too complex to implement.

Ecosystem-based fisheries management has been perceived as something desirable, but pragmatically unachievable due to several impediments being identified earlier during its implementation phase. Over the years, many of these impediments have been resolved but not well communicated to stakeholders, managers, scientists and policy-makers. As a result, several past impediments to implementing ecosystem-based fisheries management have taken on a mythical status. The authors identify six common myths, address why they in fact no longer impede ecosystem-based fisheries management, and propose solutions for moving forward. They assert that these myths need not continue to exist and that improved approaches for fisheries are indeed feasible.

Accepted: January 2015





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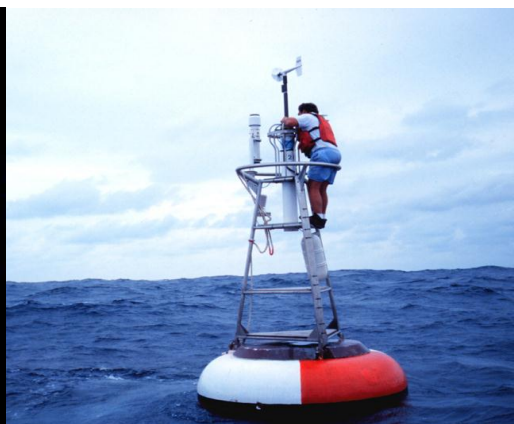
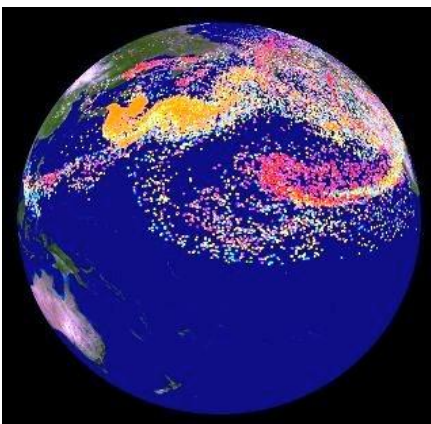
Herbivory and the resilience of Caribbean coral reefs: knowledge gaps and implications for management

Marine Ecology Progress Series (2.64)

T. C. Adam, D. E. Burkepile, B. I. Ruttenberg (NMFS/SEFSC), and M. J. Paddack

- Declines in the abundance of herbivores due to fishing and disease have been implicated in coral decline on many reefs in the Caribbean.
- The authors identify knowledge gaps that limit our ability to predict when management actions targeting herbivores are most likely to benefit reef-building corals.
- The authors make management recommendations based on our current understanding of the processes structuring coral reef ecosystems.

Herbivory is a key process on coral reefs that can facilitate reef-building corals by excluding algae that otherwise negatively impact coral settlement, growth, and survivorship. Over the last several decades, coral cover on Caribbean reefs has declined precipitously. On many reefs, large structurally complex corals have been replaced by algae and other non-reef building organisms, resulting in the collapse of physical structure and the loss of critical ecosystem services. The drivers of coral decline on Caribbean reefs are complex and vary among locations. On many reefs, populations of key herbivores have been greatly reduced by disease and overfishing and this has resulted in the proliferation of algae that hinder coral recovery following major disturbances. Yet, evidence that increases in herbivory can promote coral recovery on Caribbean reefs has been mixed. The authors discuss key contingencies that will modify the relationships between herbivores, algae, and corals, and identify critical knowledge gaps that limit our ability to predict when and where herbivores are most likely to facilitate coral persistence and recovery. Impacts of herbivores on coral reef ecosystems will vary greatly in space and time and will depend on herbivore diversity and species identity. While there are still a large number of knowledge gaps, the authors make several management recommendations based on our current understanding of the processes that structure reef ecosystems. Reversing the fate of Caribbean coral reefs will





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require the development of integrated management strategies that simultaneously address multiple stressors in addition to the impacts of fisheries on herbivore assemblages.

Accepted: December 2014

Applied fisheries oceanography: ecosystem indicators of ocean conditions inform fisheries management in the California Current

Oceanography (2.986)

W. T. Peterson, J. L. Fisher, J. O. Peterson, C. A. Morgan, B. J. Burke, and K. L. Fresh (NMFS/NWFSC)

- Physical and biological indicators of ocean conditions can help explain variation in recruitment of salmonids, sablefish, sardines, and rockfish in the California Current.
- Physical and biological oceanography data are useful in working toward stronger ecosystem based management.

Fisheries oceanography is the study of ecological relationships between fishes and the dynamics of their marine environment and aims to characterize the physical, chemical and biological factors that affect the recruitment and abundance of commercially harvested species. A recent push within the fisheries management community is towards ecosystem based management. The authors show how physical and biological oceanography data can be used to generate indicators of ‘ocean conditions’ in an ecosystem context, and how these indicators relate to the recruitment of salmonids, sablefish, sardines and rockfish in the California Current.

Published: 22 November 2014

http://www.tos.org/oceanography/archive/27-4_peterson.pdf

Expression profiles of Fsh-regulated ovarian genes during oogenesis in coho salmon
PLoS One (3.534)

J. M. Guzman, A. A. Luckenbach, Y. Yamamoto, P. Swanson (NMFS/NWFSC)

- The authors found a group of genes that increased during secondary oocyte growth and declined during maturation, showing a strong and positive correlation with





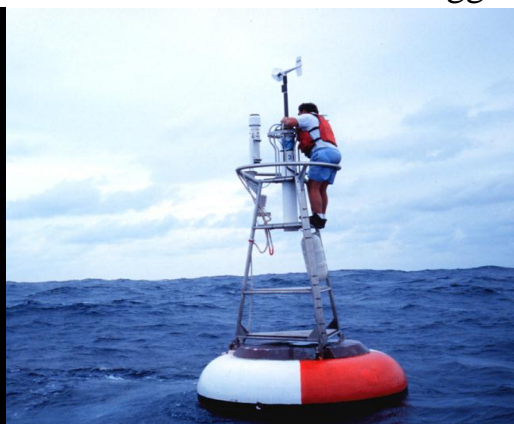
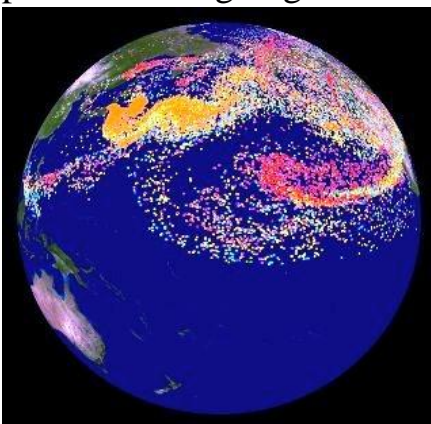
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ovarian fshr transcripts and providing further support for involvement of Fsh in the regulation of specific cellular processes. This group included genes associated with steroidogenesis (*cyp19a1a*), growth factor signaling (*inha*), cell differentiation and growth (*wt2l* and *adh8l*), and ECM components (*colla1*, *colla2*, and *dcn*).

- Other genes involved in cell survival (*clu1*, *clu2* and *ivns1abpa*), and ECM function (*fn1*) and growth factor signaling (*igf2*) seemed to play a role during early and late secondary oocyte growth, respectively.
- These data on gene expression profiles of Fsh-regulated genes during oogenesis in salmon provide a basis for more detailed studies of the role of Fsh in specific processes during ovarian follicle development in fishes.

The function of follicle-stimulating hormone (Fsh) during oogenesis in fishes is poorly understood. Using coho salmon as a fish model, we recently identified a suite of genes regulated by Fsh in vitro and involved in ovarian processes mostly unexplored in fishes, like cell proliferation, differentiation, survival or extracellular matrix (ECM) remodeling. To better understand the role of these Fsh-regulated genes during oocyte growth in fishes, we characterized their mRNA levels at discrete stages of the ovarian development in coho salmon. While most of the transcripts were expressed at low levels during primary growth (perinucleolus stage), high expression of genes associated with cell proliferation (*pim1*, *pcna*, and *mcm4*) and survival (*ddit4l*) was found in follicles at this stage. The transition to secondary oocyte growth (cortical alveolus and lipid droplet stage ovarian follicles) was characterized by a marked increase in the expression of genes related to cell survival (*clu1*, *clu2* and *ivns1abpa*). Expression of genes associated with cell differentiation and growth (*wt2l* and *adh8l*), growth factor signaling (*inha*), steroidogenesis (*cyp19a1a*) and the ECM (*colla1*, *colla2* and *dcn*) peaked in vitellogenic follicles, showing a strong and positive correlation with transcripts for *fshr*. Other genes regulated by Fsh and associated with ECM function (*ctgf*, *wapl* and *fn1*) and growth factor signaling (*bmp16* and *smad5l*) peaked in maturing follicles, along with increases in steroidogenesis-related gene transcripts. In conclusion, ovarian genes regulated by Fsh showed marked differences in their expression patterns during oogenesis in coho salmon. Our results suggest that Fsh regulates different





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ovarian processes at specific stages of development, likely through interaction with other intra- or extra-ovarian factors.

Expected publication date: Winter 2015

<http://dx.doi.org/10.1371/journal.pone.0114176>

Whale research by Roy Chapman Andrews in Japan and Korea: retracting his footsteps around Japan in 1910–1910

Japan Cetology (unknown)

Y. Uni, **R. L. Brownell, Jr.** (NMFS/SWFSC), and H. Sakurai

- The authors provide a review and synthesis of Roy Chapman Andrews' work in Japan and Korea, providing a resource for future scientific and anthropological/ethnological studies.

We followed the footsteps of Roy Chapman Andrews (RCA) when he studied whales, dolphins and porpoises in Japan in 1910, after being a member of the Smithsonian Institution's USS Albatross Philippine Expedition, and Korea in 1912. We examined the cetacean specimens that RCA collected and his correspondence, publications, photographs and journals preserved in the American Museum of Natural History (AMNH), New York. At Kii-Oshima, RCA examined eight whales and secured three skeletons and at Ayukawa he examined over 62 whales and collected a large male sperm whale. At Ulsan he studied 32 whales including 23 gray and collected several skeletons. His research activities were wholeheartedly supported by Toyo Hoge K.K. (Oriental Whaling Company) officers and workers at both the head office and the land stations. The company also presented the AMNH with two skeletons of Baird's beaked whale and killer whale. The skeletons of the sperm whale, Baird's beaked whale and killer whale were exhibited in the AMNH between 1933 and 1962, and the gray whale skeleton has been on exhibit in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. since the early 1960s. RCA also visited and took photographs in Yokohama, Nikko, Kobe, Kyoto, Moji, Taiwan, Okinawa, Tosa-Shimizu and the Seto Inland Sea. RCA photographs at Kii-Oshima, Ayukawa and Ulsan are





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the only images of early modern whaling. All these photographs and his archives are an important resource for future scientific and anthropological/ethnological studies.

Expected publication date: Winter 2015

Increasing hydrologic variability threatens depleted anadromous fish populations

Global Change Biology (8.224)

E. J. Ward, J. H. Anderson, T. J. Beechie, G. R. Pess, and M. J. Ford (NMFS/NWFSC)

- The Pacific Northwest has experienced increasing frequency of rain on snow events (in fall / winter), leading to significant increases in winter flow variability for many of the rivers in the region.
- Much of the work looking at impacts of climate change on salmon has focused on extremes in summer (drought, thermal stress, etc). In this paper, the authors show that this increased flow variability also has a negative effect on Chinook salmon population growth rates.
- This work highlights the need for better monitoring of juvenile habitat in winter months to better understand the exact mechanism of an increasingly variable environment on salmon.

Predicting effects of climate change on species and ecosystems depends on understanding responses to shifts in means (such as trends in global temperatures), but also shifts in climate variability. To evaluate potential responses of anadromous fish populations to an increasingly variable environment, we performed a hierarchical analysis of 21 Chinook salmon populations from the Pacific Northwest, examining support for changes in river flows and flow variability on population growth. More than half of the rivers analyzed have already experienced significant increases in flow variability over the last 60 years, and this study shows that this increase in variability in freshwater flows has a more negative effect than any other climate signal included in our model. Climate change models predict that this region will experience warmer winters and more variable flows, which may limit the ability of these populations to recover.

Expected publication date: Jan 2015

